(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 766 572 B1

(12) EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent:
29.10.2003 Bulletin 2003/44

(21) Application number: **95913690.4**

(22) Date of filing: **22.03.1995**

(51) Int Cl.[7]: **A61M 5/00**, A61M 39/26

(86) International application number:
PCT/US95/03198

(87) International publication number:
WO 95/025552 (28.09.1995 Gazette 1995/41)

(54) CAPLESS MEDICAL BACKCHECK VALVE

KAPPENLOSES MEDIZINISCHES RÜCKSCHLAGVENTIL

CLAPET ANTIRETOUR A USAGE MEDICAL SANS COUVERCLE D'OBTURATION

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
LT SI

(30) Priority: **22.03.1994 US 215783**
30.11.1994 US 351206

(43) Date of publication of application:
09.04.1997 Bulletin 1997/15

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EP 0 766 572 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] This invention relates generally to fluid handling, nad more particularly to a check valve for medical uses.

So-called needless injection ports, installed in infusion lines, provide sites where supplemental medication or other fluids may be introduced into the infusion line. Such ports actually contain quick-connect valves which close atuomatically when the medication syringe or line is withdrawn form the valve. Representative pertinent U.S. Patents include No. 3,570,484, No. 3,831,629, No. 5,006,114, No. 5.049,128, No. 5,147,333, No. 5,201,725 and No. 5,242,432.

US-A-5,284,475 describes a luer valve adapter consisting of a valve having a tubular wall. Being supported by fingers, regular extended from the inside of the housing of the valve, the resilient, elastomeric construction of the valve allows an opening of the valve.

A needleless injection port must, of course, be and remain sanitary. It cannot admit air or other fluids accidentally, and must not drip or leak, either in use, or thereafter. It would be best to isolate moving parts of an injection port, as much as possible, from liquids flowing therethrough, and to provide a vent for gases in the valve, to prevent pressure differentials from occuring between the fluids (air and liquid) within the valve. To prevent leakage, we surrounded all the moving parts of a injection port valve with an elastomeric sheath, constraining fluid to flow through the device only outside the sheath. This approach has the advantages of positively preventing liquid-air leaks, by eliminating sliding piston seals, but it creates a closed volume within the sheath which has to vbented, to prevent air pressure form being developed as the valve opens. The problem of venting is also addressed by this application.

SUMMARY OF THE INVENTION

[0002] An object of the invention is to provide a simple yet reliable check valve for use in medical infusion lines and the like. Another object of the invention to the prevent leakage onto or out of an infusion line when the valve is inactive, while providing a valve with an exposed surface which, upon depressing the tip of a syringe, opens a flow path into the line.

These and other objects are obtained by a medical backcheck valve comprising a hollow housing having an upper end and a lower end, a piston assembly contained within the housing for controlling liquid flow there through and biased to a closed valve position, said piston assembly comprising a rigid plug and a tubular flexible sheath. The medical backcheck valve is characterised in that the valve further comprises a fitting secured within the lower end of the housing, and in that said rigid plug having one end protruding from the upper end of the housing when said valve is closed and said sheath having a first diameter upper end surrounding the plug, with a first flow space between the housing and the sheath, a main seal for controlling flow through said first flow space, and a tubular second diameter lower end where the second diameter is larger than the first diameter, the bottom portion of the lower end of said sheath being secured to at least one of the fitting and the housing to prevent liquid from entering the sheath.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] In the accompanying drawings,

Figure 1 is a top plan view of a valve;
Figure 2 is a sectional view of the valve, closed, on a vertical axial plane (designated 2 - 2 in Fig. 1);
Figure 3 shows the valve of fig. 2 open;
Figure 4 is an exploded side elevation of the valve, showing its five components prior to assembly;
Figure 5 is a bottom plan view of only the valve housing;
Figure 6 is a horizontal section taken through the fitting only on the plane 6-6 in Fig. 2;
Figure 7 is a view, corresponding to Fig. 2, of a modified form of a backcheck valve; and
Figure 8 is a view, like Fig. 2, of yet another form of a backcheck valve.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0004] A medical backcheck valve embodying the invention includes an outer housing 10 (Figs. 1-4) made by injection molding a rigid thermoplastic, such as a polycarbonate. The housing has a tubular upper section 12 of a first diameter, and a lower section 14 of a larger second diameter. The outer surface of the housing has a smooth transition 16 (Fig. 2) between the upper and lower sections. The lower section has a circumferential flange 18 of a third, even larger diameter at its bottom. Ribs on the outside of the housing improve handling.

[0005] Inside, the housing has a slightly tapered inlet bore 20 at its upper end, a larger main bore 22 within the lower section, and a counterbore 24 at the bottom, defined by the flange. Eight equally spaced axially extending upper recesses 26 in the transition area serve as flow channels, and there are eight lower axial grooves 28 on the inner surface of the main bore.

[0006] A flexible elastomeric piston sheath 30, reinforced with a rigid plastic plug 32, is installed into the housing from the bottom, and retained therein by a plastic luer nut fitting 34 which is secured the counterbore by welding or adhesive.

[0007] The fitting comprises a downwardly tapering fluid port 36 surrounded by an internally threaded skirt 38; together these serve as a female luer nut. The peripheral rim 40 just above the skirt is joined to the housing by welding or an adhesive. Above the rim is a base portion 42 of reduced diameter, surrounded by an annular gap or plenum 44 which communicates with the

space around the piston via the grooves 28. Four liquid passages 46 extend radially from the top of the port to the plenum. To allow air to escape from the valve, there are two axially extending vent holes 48 which pass between, but do not intersect, the liquid passages. Each vent hole terminates within the space 50 between the skirt and the port.

[0008] Looking closely at Figure 4, one can see that the top surface of the base portion of the fitting is peripherally undercut to form an annular seat 52 extending just outside the tops of the vent holes.

[0009] Rising from the base, at is center, is a centering post 54 having a small-diameter tip 56. See Fig. 2. The cross-section of the post is "X"-shaped, to reduce its mass. The function of the post is to center a stainless compression spring 58, while the tip centers the piston plug when the valve is open.

[0010] The silicone rubber piston sheath is a surface of revolution. At its lower end is a circular foot 60 having an enlarged circumferential bead 62 that is permanently clamped between the seat 52 at the top of the fitting base and an undercut 64 at the bottom of the main bore. The bead thus prevents liquid from entering the interior area occupied by the spring.

[0011] The thin, flexible tubular wall 66 of the sheath above the foot is bounded above by a thickened main seal 68. The upper surface of this seal, seen in detail in Figure 4, includes a rounded lip 70 which axially seats against the bottom surface of a conical shoulder 72 formed inside the body near the transition, when the valve is closed. Above the main seal, the piston has a smaller-diameter tubular section 74 terminating at an out-turned flange 76 forming an auxiliary seal.

[0012] The plug, forced into the piston from its lower end before the piston assembly is inserted into the housing, has a dished top 78 with three (illustrated) or more spaced protuberances 80 that prevent this surface from occluding or blocking the end of a syringe tip "S" (Fig. 3) or the like pushed against it to open the valve. Each protuberance is essentially a wedge whose upper face is a portion of a common spherical surface.

[0013] Below the top of the plug, there are a pair of circumferential barbs 82,84 for retaining the plug within the piston. At the bottom, the plug has a flange 86 that snaps into a groove 88 in the main seal. This flange also serves as a seat for the upper end of the compression spring, which is kept centered by a collar 90 at the bottom of the plug. A blind bore 92, having a flared mouth 94 opening downwardly, is provided at the bottom end of the plug. The bore is slightly larger than the tip of the lower centering post described previously.

[0014] During assembly, as suggested by Fig. 4, the plug is first forced into the rubber piston sheath (alternatively, it could be insert molded to the piston); then that assembly is inserted into the bottom of the housing. Finally, the spring and the fitting are inserted, and the fitting is permanently attached to the housing.

[0015] The valve described above is normally kept closed (Fig. 2) by the spring force. However, one can open the valve by inserting the tip "S" of a syringe (as in Fig. 3), or other appropriately sized conduit, into the tapered bore at the top of the housing. Doing so depresses the piston plug, and unseats the main seal. The plug must be moved sufficiently far, however, so that the auxiliary seal unseats, before liquid begins to flow from the syringe tip into the housing.

[0016] As the plug is depressed, the tip enters into the bore, keeping the plug centered, so that the sides of the piston do not drag on the main bore of the housing, and so that the piston seats properly when the syringe tip is removed.

[0017] Air escapes through the vent holes in the fitting as the piston is depressed.

[0018] Interference between the tip 56 and the bottom of the bore 92 limits downward movement of the plug.

[0019] The recesses and grooves mentioned above keep the main and auxiliary seals from blocking the flow path, which is depicted by arrows in Figure 2. They also keep the flaccid compressed tubular portion of the piston from blocking flow. Note that the fitting serves as a cross-over so that the inner volume above the fitting communicates with the outer volume below it, and vice-versa.

[0020] Because the tubular lower portion 66 of the sheath is thin, it can expand and contract radially. In its intended medical environment, working pressures are not large. In any event, compression and expansion of the sheath are limited by the compression spring, and the main bore of the housing, respectively.

[0021] An alternative form of a backcheck valve is shown in Figures 7 and 8. The sheath and its plug 32 are identical to that described above, but the fitting has been replaced by a simpler closure having air vent ports 48, as in the other embodiment, but lacking liquid channels. The centering post 54 and tip 56 are the same. In this embodiment, the housing has been replaced by a two-piece structure, the upper portion 100 of which terminates at the level of the main seal seat. The lower portion 110 has a pair of laterally extending offset inlet and outlet ports 113,115. When the valve is pushed fully open, the main seal 68 blocks the normal flow path between the inlet and outlet ports, allowing only fluid from the syringe tip to pass to the outlet.

[0022] The valve depicted in Fig. 8 is like that of Figure 2, except for the structure of the plug and the centering post. The modified plug is a two-piece assembly comprising a body portion 132 and a collar 190. The collar has a through-bore with a circumferential rib near its bottom end. A head 133, having a diameter slightly larger than the rib, is formed at the bottom of the plug. The collar is pushed over the head during assembly of the valve, and is securely retained by an annular shoulder defining the head.

[0023] In the above description and the claims that follow, words descriptive of orientation (upper, bottom, etc.) are provided to clarify the disclosure of the inven-

tion. They refer to the orientation shown in the drawings. However, it should be understood that the valve may be used in any orientation.

[0024] Preferred materials for various parts of the invention are identified above, to reveal the best mode of the invention and to enable others to make and use it. Nevertheless, it is expected that other materials may prove suitable, or even superior; the invention is not limited to particular materials.

[0025] Since the invention is subject to modifications and variations, it is intended that the foregoing description and the accompanying drawings shall be interpreted as illustrative of only one form of the invention, whose scope is to be measured by the following claims.

Claims

1. A medical backcheck valve comprising
a hollow housing (10) having an upper end (12) and a lower end (14),
a piston assembly (30, 32) contained within the housing (10) for controlling liquid flow therethrough and biased to a closed valve position,
said piston assembly comprising a rigid plug (32) and a tubular flexible sheath (30),
characterised in that the valve further comprises a fitting (34) secured within the lower end (14) of the housing (10), and **in that** said rigid plug having one end protruding from the upper end of the housing (10) when said valve is closed and said sheath having a first diameter upper end (74) surrounding the plug, with a first flow space (26) between the housing (10) and the sheath (30), a main seal (68) for controlling flow through said first flow space, and a tubular second diameter lower end (60, 66) where the second diameter is larger than the first diameter, the bottom portion of the lower end (60) of said sheath (30) being secured to at least one of the fitting (34) and the housing (10) to prevent liquid from entering the sheath (30).

2. The medical backcheck valve according to claim 1, further comprising a vent hole (48) extending through the fitting (34) and providing communication between ambient air and the interior of the sheath (30).

3. The medical backcheck valve according to claim 1 or 2, wherein the housing (10) has an internal shoulder (72) functioning as a valve seat, and the sheath (30) is formed with an integral sealing lip (70) that bears against the seat in the closed position of the piston (66), to prevent liquid from flowing through said first flow space.

4. The medical backcheck valve according to claim 3, wherein said shoulder (72) faces downward, said lip (70) is a circumferential lip facing said shoulder (72), and said closed position is the uppermost position of the piston.

5. The medical backcheck valve according to claim 3 or 4, wherein the seat (72) is a conical surface facing away from the axis of the housing (10), and the lip (70) is formed on a thickened portion of the sheath (30) having an upwardly dished surface.

6. The medical backcheck valve according to one of the claims 1 to 5, wherein the plug (32) has a circumferential flange within said thickened portion, supporting said lip (70).

7. The medical backcheck valve according to one of the claims 1 to 6, comprising a spring (58) for biasing said piston (66) toward its closed position.

8. The medical backcheck valve according to claim 7, wherein said spring (58) is a compression coil spring whose upper end bears against said plug (32), and whose lower end bears against said fitting (34).

9. The medical backcheck valve according to claim 7 or 8, wherein said fitting (34) has an upward projecting post (54) for centering said spring (58) within the housing (10).

10. The medical backcheck valve according to claim 9, further comprising a tip (56) extending upward from said post (54), and said plug (32) having an internal blind bore (92), open at the bottom, into which the tip (56) enters when the plug (32) is moved downward, to keep the piston (66) centered within the housing (10).

11. The medical backcheck valve according to one of the claims 1 to 10, further comprising a second flow passage around the sheath (30), below said lip (70), whereby the lip (70) controls flow between said first and second flow spaces.

12. The medical backcheck valve according to one of the claims 1 to 11, wherein the fitting (34) has means defining a liquid outlet port, and at least one passage extending between the outlet port and said second flow space.

13. The medical backcheck valve according to one of the claims 1 to 12, wherein the fitting (34) has at least one air vent hole (48) extending between ambient air and the interior of said sheath (30), said vent hole (48) being isolated from said passage.

14. The medical backcheck valve according to one of the claims 1 to 13, wherein said housing (10) has a

counterbore (24) at its lower end,, said fitting (34) being secured in the counterbore (24), and the fitting (34) having a portion of lesser diameter within the counterbore (24), defining an annular plenum (44), said passage (46) extending between the outlet port (36) and the plenum (44), and the plenum communicating with the second flow space.

15. The medical backcheck valve according to one of the claims 11 to 14, wherein said second flow space includes at least one axially extending groove (128) formed on the interior of the housing, to prevent the sheath (30) from occluding the flow space.

16. The medical backcheck valve according to one of the claims 1 to 14, wherein the sheath (30) has a peripherally extending sealing flange (62) at *its* lower end, said flange being clamped between an upper surface (52) of said fitting (34) and a shoulder at the top of said counterbore (24).

17. The medical backcheck valve according to one of the claims 1 to 16, wherein said housing (10) has inlet and outlet ports, extending on offset transverse axes from opposite sides of said body, and said piston (66) is movable from said closed position to a second position where the lip is below both said axes.

18. The medical backcheck valve according to one of the claims 1 to 17, wherein said plug (32) comprises a body portion (132) insertable into the sheath (30) from above and a collar (190) insertable into the sheath (30) from below, said collar (190) having a through bore containing an internally protruding rib and said plug (32) having a head (133) slightly larger in diameter than said rib, but capable of passing through said bore, whereby the collar (190) is retained on the plug by said internal rib.

19. The medical backcheck valve according to claim 18, wherein the body portion (132) of the plug (32) has external circumferential ribs for retaining the sheath (30) thereon.

Patentansprüche

1. Medizinisches Rückschlagventil, welches umfasst:

   ein hohles Gehäuse (10) mit einem oberen Ende (12) und einem unteren Ende (14),
   eine Kolbeneinheit (30, 32), die innerhalb des Gehäuses (10) aufgenommen ist, um eine Flüssigkeitsströmung durch dieses zu steuern, und die zu einer geschlossenen Ventilstellung vorgespannt ist, wobei die Kolbeneinheit einen starren Stopfen (32) und eine röhrenförmige flexible Ummantelung (30) aufweist,

   dadurch gekennzeichnet, dass das Ventil weiterhin ein Anschlussstück (34) umfasst, welches innerhalb des unteren Endes (14) des Gehäuses (10) befestigt ist, und dass der starre Stopfen (32) ein Ende aufweist, welches von dem oberen Ende des Gehäuses (10) hervorsteht, wenn das Ventil geschlossen ist, und die Ummantelung ein den Stopfen umgebendes oberes Ende (74) mit einem ersten Durchmesser, einen ersten Durchflussraum (26) zwischen dem Gehäuse (10) und der Ummantelung (30), eine Hauptdichtung (68) zur Steuerung der Strömung durch den ersten Durchflussraum, und ein röhrenförmiges unteres Ende (60, 66) mit einem zweiten Durchmesser aufweist, wobei der zweite Durchmesser größer als der erste Durchmesser ist, und der untere Abschnitt des unteren Endes (60) der Ummantelung (30) mindestens an einem des Anschlussstücke (34) und des Gehäuses (10) befestigt ist, um zu verhindern, dass Flüssigkeit in die Ummantelung (30) eindringt.

2. Medizinisches Rückschlagventil nach Anspruch 1, welches weiterhin ein Belüftungsloch (48) umfasst, das sich durch das Anschlussstück (34) hindurch erstreckt und eine Verbindung zwischen der Umgebungsluft und dem Inneren der Ummantelung (30) herstellt.

3. Medizinisches Rückschlagventil nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** das Gehäuse (10) eine interne Schulter (72) mit der Funktion eines Ventilsitzes aufweist, und dass die Ummantelung (30) mit einer integrierten Dichtlippe (70) ausgebildet ist, welche gegen den Ventilsitz in der geschlossenen Stellung des Kolbens (66) drückt, um zu verhindern, dass Flüssigkeit durch den ersten Durchflussraum strömt.

4. Medizinisches Rückschlagventil nach Anspruch 3, **dadurch gekennzeichnet, dass** die Schulter (72) nach unten gerichtet ist, dass die Dichtlippe (70) als eine umlaufende Lippe ausgebildet ist, welche zu der Schulter (72) hin weist, und dass die geschlossene Stellung die oberste Stellung des Kolbens ist.

5. Medizinisches Rückschlagventil nach Anspruch 3 oder 4, **dadurch gekennzeichnet, dass** der Ventilsitz (72) eine konische Fläche ist, welche von der Achse des Gehäuses (10) hinweg weist, und dass die Dichtlippe (70) auf einem verdickten Abschnitt der Ummantelung (30) gebildet ist und eine nach oben weisende tellerförmige Oberfläche aufweist.

6. Medizinisches Rückschlagventil nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** der Stopfen (32) innerhalb des verdickten Ab-

schnitts einen umlaufenden Flansch aufweist, welcher die Dichtlippe (70) unterstützt.

7. Medizinisches Rückschlagventil nach einem der Ansprüche 1 bis 6, welches eine Feder (58) zur Vorspannung des Kolbens (66) in seine geschlossene Stellung umfasst.

8. Medizinisches Rückschlagventil nach Anspruch 7, **dadurch gekennzeichnet, dass** die Feder (58) eine spiralförmige Druckfeder ist, deren oberes Ende gegen den Stopfen (32) drückt, und deren unteres Ende gegen das Anschlussstück (34) drückt.

9. Medizinisches Rückschlagventil nach Anspruch 7 oder 8, **dadurch gekennzeichnet, dass** das Anschlussstück (34) einen nach oben gerichteten Sockel (54) zur Zentrierung der Feder (58) innerhalb des Gehäuses (10) aufweist.

10. Medizinisches Rückschlagventil nach Anspruch 9, welches weiterhin eine sich von dem Sockel (54) nach oben hin erstrekkendes Spitze (56) umfasst, wobei der Stopfen (32) eine innenliegende Sackbohrung (92) aufweist, die nach unten offen ist, und in welche die Spitze (56) eintritt, wenn der Stopfen (32) nach unten bewegt wird, um den Kolben (66) innerhalb des Gehäuses (10) zu zentrieren.

11. Medizinisches Rückschlagventil nach einem der Ansprüche 1 bis 10, welches weiterhin einen zweiten Durchflussraum um die Ummantelung (30) herum unter der Dichtlippe (70) umfasst, wobei die Dichtlippe (70) die Strömung zwischen dem ersten und dem zweiten Durchflussraum steuert.

12. Medizinisches Rückschlagventil nach einem der Ansprüche 1 bis 11, **dadurch gekennzeichnet, dass** das Anschlussstück (34) Mittel zur Festlegung einer Auslassöffnung aufweist, und mindestens einen Durchgang aufweist, welcher sich zwischen der Auslassöffnung und dem zweiten Durchflussraum erstreckt.

13. Medizinisches Rückschlagventil nach einem der Ansprüche 1 bis 12, **dadurch gekennzeichnet, dass** das Anschlussstück (34) mindestens ein Belüftungsloch (48) aufweist, welches sich zwischen der Umgebungsluft und dem Inneren der Ummantelung (30) erstreckt, wobei das Belüftungsloch (48) von dem Durchgang getrennt angeordnet ist.

14. Medizinisches Rückschlagventil nach einem der Ansprüche 1 bis 13, **dadurch gekennzeichnet, dass** das Gehäuse (10) eine zylindrische Ausnehmung (24) an seinem unteren Ende aufweist, dass das Anschlussstück (34) innerhalb der zylindrischen Ausnehmung (24) befestigt ist und dass das Anschlussstück (34) einen Abschnitt mit einem kleineren Durchmesser innerhalb der zylindrischen Ausnehmung (24) aufweist, womit es einen ringförmigen Raum (44) festlegt, und dass sich der Durchgang (46) zwischen der Auslassöffnung (36) und dem ringförmigen Raum (44) erstreckt, und dass der ringförmige Raum mit dem zweiten Durchflussraum in Verbindung steht.

15. Medizinisches Rückschlagventil nach einem der Ansprüche 11 bis 14, **dadurch gekennzeichnet, dass** der zweite Durchflussraum mindestens eine sich axial erstreckende Nut (128) beinhaltet, welche auf der Innenseite des Gehäuses eingebracht ist, um zu verhindern, dass die Ummantelung (30) den Durchflussraum verstopft.

16. Medizinisches Rückschlagventil nach einem der Ansprüche 1 bis 14, **dadurch gekennzeichnet, dass** die Ummantelung (30) einen sich im Randbereich erstreckenden Dichtflansch (62) in ihrem unteren Abschnitt aufweist, wobei dieser Flansch zwischen einer oberen Fläche (52) des Anschlussstücks (34) und einer Schulter an der Oberkante der zylindrischen Ausnehmung befestigt ist.

17. Medizinisches Rückschlagventil nach einem der Ansprüche 1 bis 16, **dadurch gekennzeichnet, dass** das Gehäuse (10) Einlassund Auslassöffnungen aufweist, welche sich auf versetzten Querachsen von gegenüberliegenden Seiten des Körpers erstekken, und dass der Kolben (66) aus der geschlossenen Stellung in eine zweite Stellung bewegbar ausgebildet ist, in welcher sich die Dichtlippe unterhalb der beiden Achsen befindet.

18. Medizinisches Rückschlagventil nach einem der Ansprüche 1 bis 17, **dadurch gekennzeichnet, dass** der Stopfen (32) einen Körperabschnitt (132), welcher in die Ummantelung (30) von oben einschiebbar ausgebildet ist, und eine Manschette (190) umfasst, die in die Ummantelung (30) von unten einschiebbar ist, wobei die Manschette (190) eine durchgehende Bohrung aufweist, welche eine nach innen hervortretende Rippe besitzt, und wobei der Stopfen (32) einen Kopf (133) aufweist, welcher im Durchmesser etwas kleiner ist als die Rippe, aber so ausgebildet ist, dass er durch die Bohrung geht, wobei die Manschette (190) von der internen Rippe auf dem Stopfen (32) gehalten wird.

19. Medizinisches Rückschlagventil nach Anspruch 18, **dadurch gekennzeichnet, dass** der Körperabschnitt (132) des Stopfens (32) äußere umlaufende Rippen aufweist, um die Ummantelung (30) auf ihm zu halten.

Revendications

1. Soupape antisiphon médicale comprenant
   un logement creux (10) présentant une extrémité supérieure (12) et une extrémité inférieure (14),
   un ensemble de piston (30, 32) compris à l'intérieur du logement (10) destiné à commander l'écoulement de liquide à travers celui-ci et incliné vers une position de soupape fermée,
   ledit ensemble de piston comprenant un bouchon rigide (32) et une gaine flexible tubulaire (30) **caractérisée en ce que** la soupape comprend en outre un raccord (34) fixé à l'intérieur de l'extrémité inférieure (14) du logement (10), et **en ce que** ledit bouchon rigide présentant une extrémité en saillie depuis l'extrémité supérieure du logement (10) quand ladite soupape est fermée et la dite gaine présentant une première extrémité de diamètre (74) entourant le bouchon, avec un premier espace d'écoulement (26) entre le logement (10) et la gaine (30), un joint principal (68) destiné à commander l'écoulement à travers ledit premier espace d'écoulement et une seconde extrémité inférieure de diamètre (60, 66) où le second diamètre est plus grand que le premier diamètre, la partie de fond de l'extrémité inférieure (60) de ladite gaine (30) étant fixée à au moins un du raccord (34) et du logement (10) pour empêcher au liquide d'entrer dans la gaine (30).

2. Soupape antisiphon médicale selon la revendication 1, comprenant en outre un trou de purge (48) s'étendant à travers le raccord (34) et proposant une communication entre l'air ambiant et l'intérieur de la gaine (30).

3. Soupape antisiphon médicale selon la revendication 1 ou 2, dans laquelle le logement (10) présente un épaulement intérieur (72) fonctionnant en tant que siège de soupape et la gaine (30) est formée *avec* une lèvre d'étanchéité intégrée (70) qui porte contre le siège dans la position fermée du piston (66), pour empêcher le liquide de s'écouler à travers ledit premier espace d'écoulement.

4. Soupape antisiphon médicale selon la revendication 3, dans laquelle ledit épaulement (72) fait face vers le bas, ladite lèvre (70) est une lèvre périphérique faisant face au dit épaulement (72) et ladite position fermée est la position la plus haute du piston.

5. Soupape antisiphon médicale selon la revendication 3 ou 4, dans laquelle le siège (72) est une surface conique faisant face hors de l'axe du logement (10) et la lèvre (70) est formée sur une partie épaissie de la gaine (30) présentant une surface incurvée vers le haut.

6. Soupape antisiphon médicale selon l'une quelconque des revendications 1 à 5, dans laquelle le bouchon (32) présente un bord périphérique à l'intérieur de ladite partie épaissie, supportant ladite lèvre (70).

7. Soupape antisiphon médicale selon l'une quelconque des revendications 1 à 6, comprenant un ressort (58) destiné à biaiser ledit piston (66) vers la position fermée.

8. Soupape antisiphon médicale selon l'une quelconque des revendications 1 à 6, dans laquelle ledit ressort (58) est un ressort à compression dont l'extrémité supérieure porte contre ledit bouchon (32) et dont l'extrémité inférieure porte contre ledit raccord (34).

9. Soupape antisiphon médicale selon la revendication 7 ou 8, dans laquelle ledit raccord (34) présente un montant en saillie vers le haut (54) destiné à centrer ledit ressort (58) à l'intérieur du logement (10).

10. Soupape antisiphon médicale selon la revendication 9, comprenant en outre une pointe (56) s'étendant vers le haut depuis ledit montant (54), et ledit bouchon (32) présentant un alésage borgne (92), ouvert au niveau du fond à l'intérieur duquel la pointe (56) entre quand le bouchon (32) est déplacé vers le bas, pour conserver le piston (66) centré à l'intérieur du logement (10).

11. Soupape antisiphon médicale selon l'une quelconque des revendications 1 à 10, comprenant en outre un second passage d'écoulement autour de la gaine (30), sous ladite lèvre (70), moyennant quoi la lèvre (70) commande l'écoulement entre lesdits premier et second espaces d'écoulement.

12. Soupape antisiphon médicale selon l'une quelconque des revendications 1 à 11, dans laquelle le raccord (34) présente des moyens définissant un orifice de sortie de liquide et au moins un passage s'étendant entre l'orifice de sortie et ledit second espace d'écoulement.

13. Soupape antisiphon médicale selon l'une quelconque des revendications 1 à 12, dans laquelle ledit raccord (34) présente au moins un trou de purge d'air (48) s'étendant entre l'air ambiant et l'intérieur de ladite gaine (30), ledit trou de purge (48) étant isolé dudit passage.

14. Soupape antisiphon médicale selon l'une quelconque des revendications 1 à 13, dans laquelle ledit logement (10) présente une fraise à lamer (24) au

niveau de son extrémité inférieure, ledit raccord (34) étant fixé dans la fraise à lamer (24) et le raccord (34) présentant une partie de moindre diamètre à l'intérieur de la fraise à lamer (24), définissant un collecteur primaire annulaire (44), ledit passage (46) s'étendant entre l'orifice de sortie (36) et le collecteur primaire (44) et le collecteur primaire (44) communiquant avec le second espace d'écoulement.

15. Soupape antisiphon médicale selon l'une quelconque des revendications 11 à 14, dans laquelle ledit second espace d'écoulement comprend au moins une rainure s'étendant de manière axiale (128) formée sur l'intérieur du logement afin d'empêcher la gaine (30) de fermer l'espace d'écoulement.

16. Soupape antisiphon médicale selon l'une quelconque des revendications 1 à 14, dans laquelle la gaine (30) présente une bride de fermeture s'étendant de manière périphérique (62) au niveau de son extrémité inférieure, ladite bride étant encastrée entre une surface supérieure (52) dudit raccord (34) et un épaulement au niveau du sommet de ladite fraise à lamer (24).

17. Soupape antisiphon médicale selon l'une quelconque des revendications 1 à 16, dans laquelle ledit logement (10) présente un orifice d'entrée et un orifice de sortie, s'étendant sur des axes transversaux décalés des côtés opposés dudit corps, et ledit piston (66) est mobile depuis ladite position fermée vers une seconde position où la lèvre est sous lesdits deux axes.

18. Soupape antisiphon médicale selon l'une quelconque des revendications 1 à 17, dans laquelle ledit bouchon (32) comprend une partie formant corps (132) insérable à l'intérieur de la gaine (30) depuis le dessus et un collier (190) insérable à l'intérieur de la gaine (30) depuis le dessous, ledit collier (190) présent un trou débouchant comprenant une nervure en saillie vers l'intérieur et ledit bouchon (32) présentant une tête (133) légèrement plus grande en diamètre que ladite nervure, mais capable de passer à travers ledit trou, moyennant quoi le collier (190) est retenu sur le bouchon par ladite nervure intérieure.

19. Soupape antisiphon médicale selon la revendication 18, dans laquelle la partie formant corps (132) du bouchon (32) présente des nervures périphériques extérieures destinées à retenir la gaine sur celle-ci.

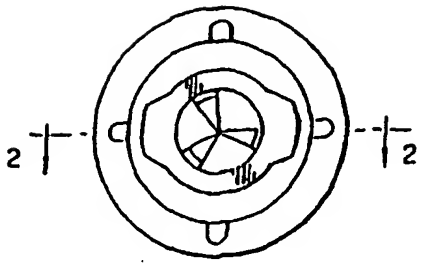

FIG. 1

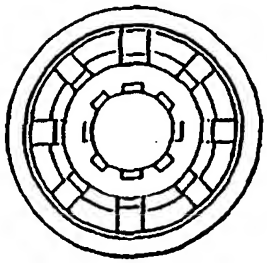

FIG. 5

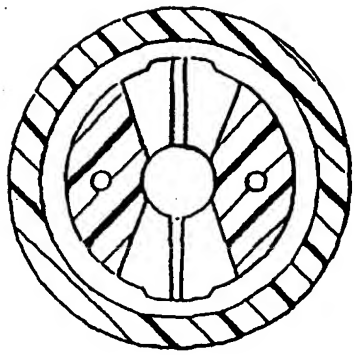

FIG. 6

FIG. 2

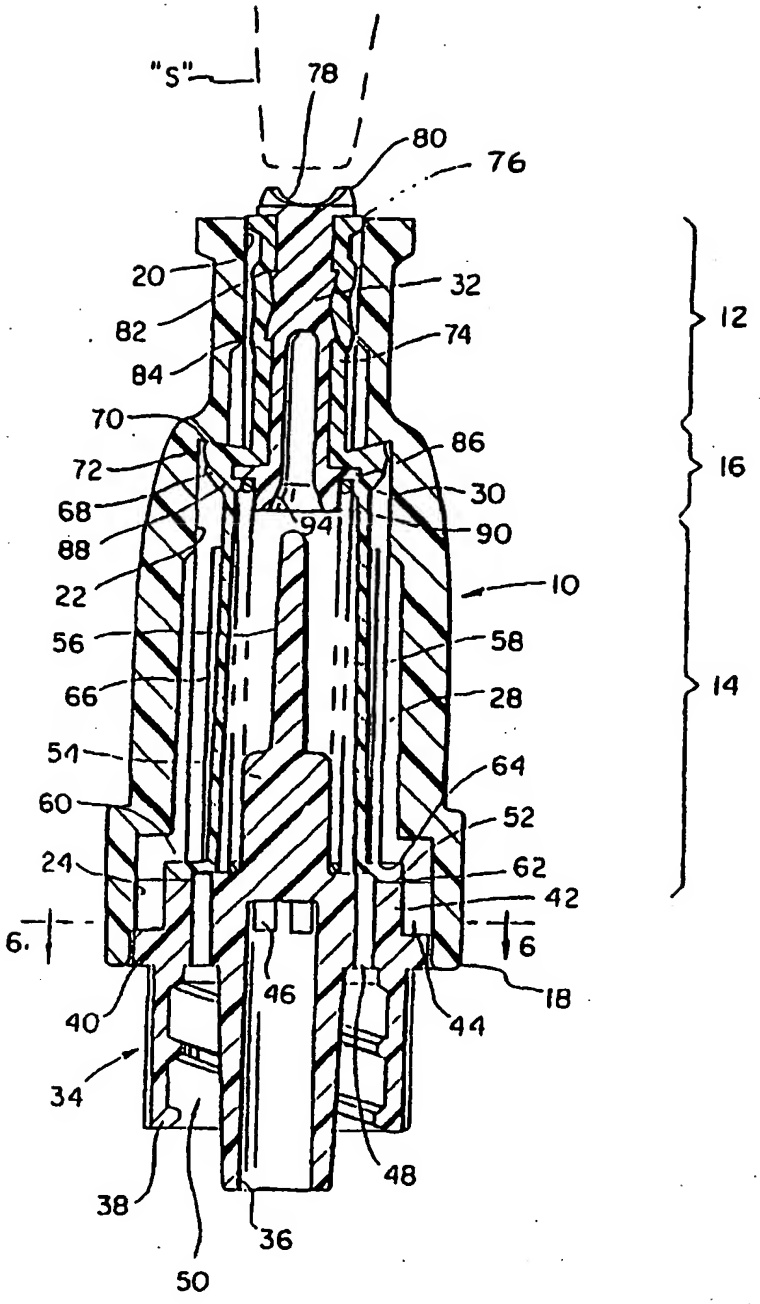
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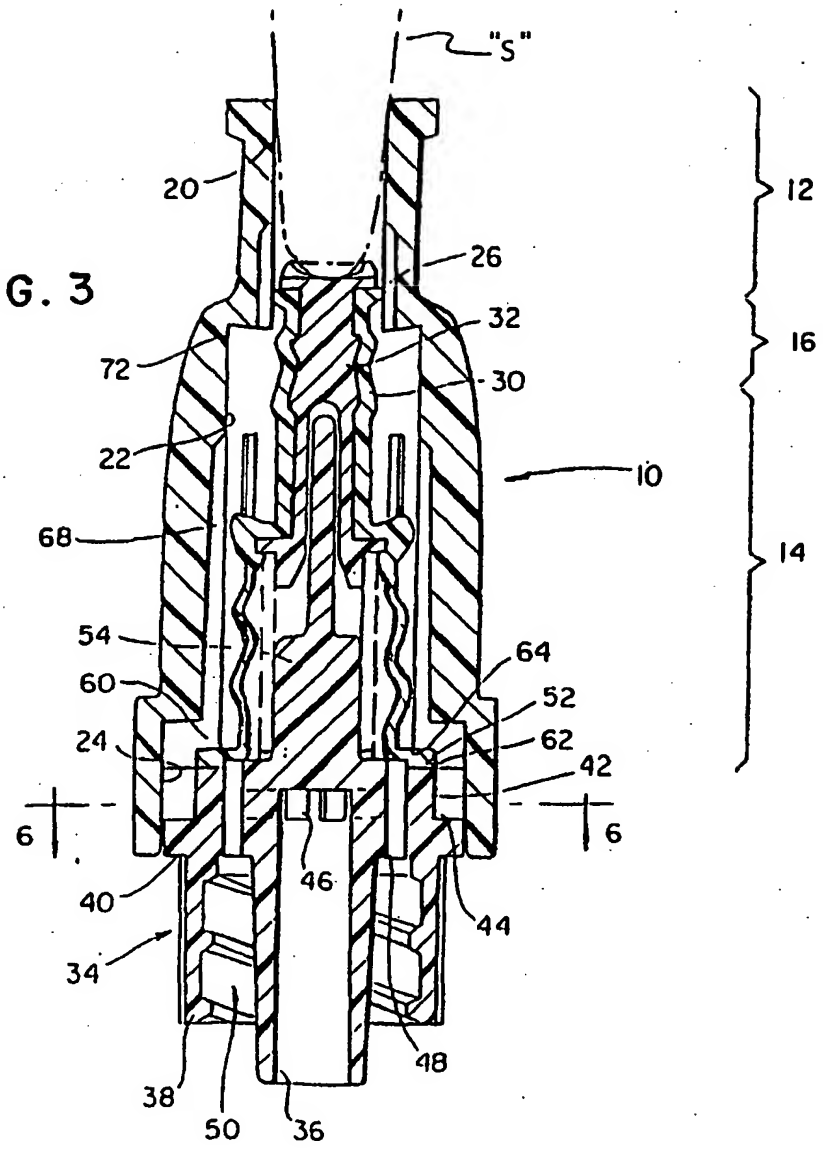
FIG. 3


"S"
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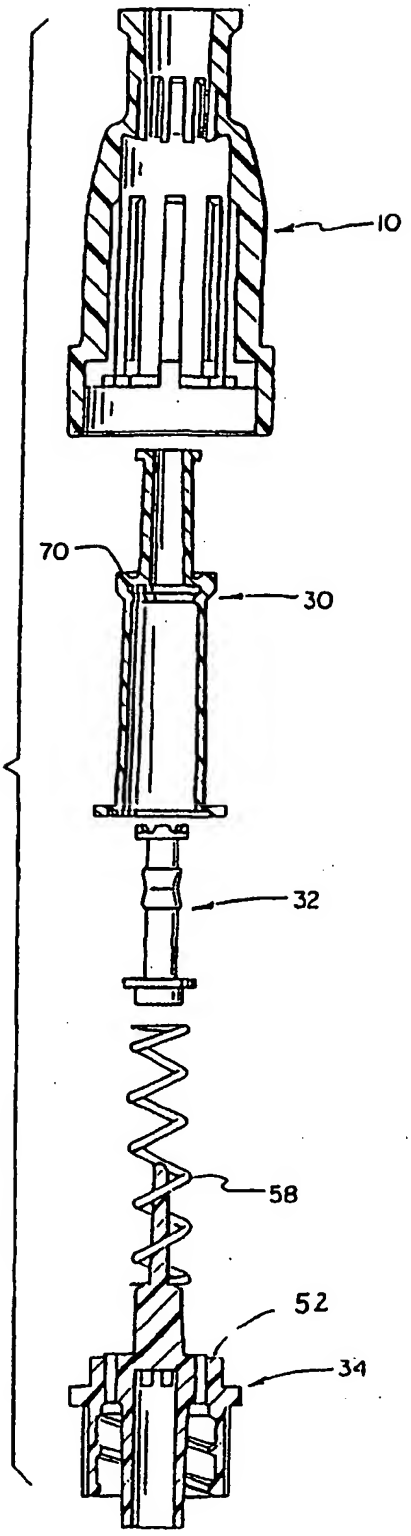

FIG. 4

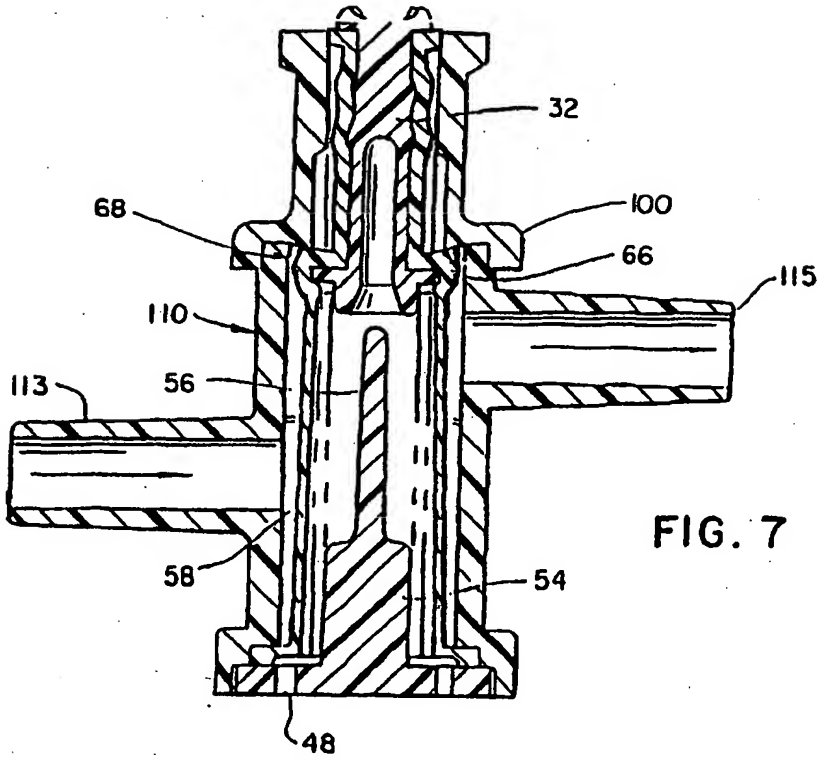

FIG. 7

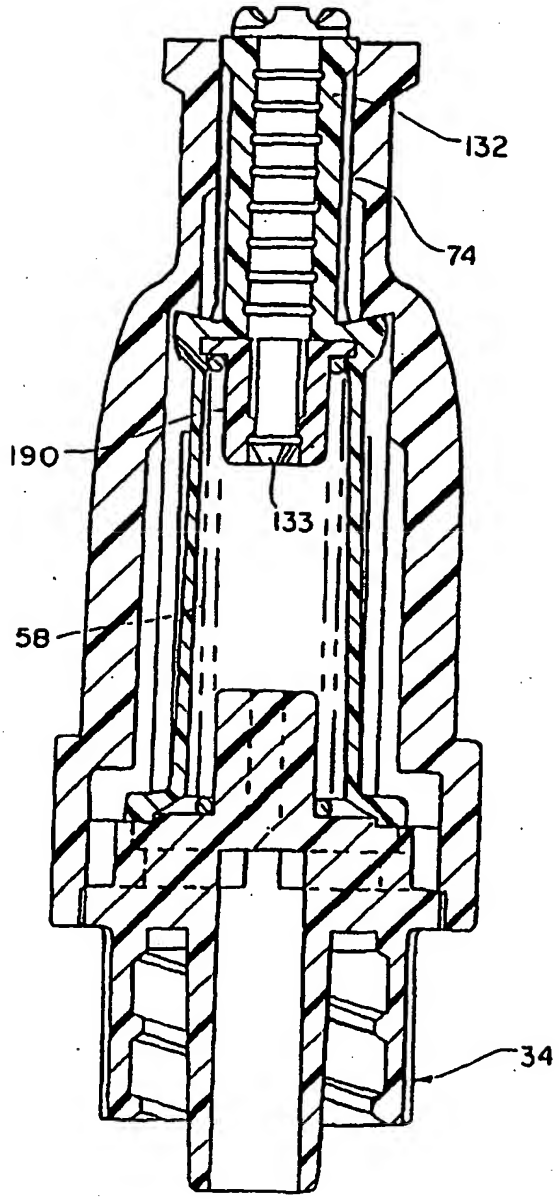

FIG. 8